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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/091,416	03/07/2002	Neta Aizenbud-Reshef	AIZENBUD=1	8893
1444	7590	12/16/2005	EXAMINER	
BROWDY AND NEIMARK, P.L.L.C. 624 NINTH STREET, NW SUITE 300 WASHINGTON, DC 20001-5303			DENG, ANNA CHEN	
			ART UNIT	PAPER NUMBER
			2191	

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/091,416	<b>Applicant(s)</b> AIZENBUD-RESHEF ET AL.	
	<b>Examiner</b> Anna Deng	<b>Art Unit</b> 2191	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☐ Claim(s) 1-38 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/12/2002</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

1. Claims 1 – 38 are pending and have been examined.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 – 17, 19 – 24, and 29 – 38 are rejected under 35 U.S.C. 102 (e) as being anticipated by Alur et al. US 6,516,306 B1 (hereinafter Alur).

**Per Claim 1:**

Alur discloses:

- A method for assessing adequacy of message flow testing (col. 2, lines 12 – 16), comprising:
- defining coverage criteria for testing a message flow through a set of message flow elements (col. 2, lines 37 – 48);
- determining a message-flow-coverage-goal for the message flow with respect to the coverage criteria (col. 2, lines 18 – 26);
- designing a test suite responsive to the message-flow-coverage-goal (col. 2, lines 27 – 35);

- applying the test suite to the message flow to generate a coverage result for the set of message flow elements(col. 2, lines 22 – 26) ;
- and comparing (verification) the coverage result with the message-flow-coverage-goal (col. 2, lines 17 – 26, and lines 48 – 51, ).

**Per Claim 2:**

Alur discloses:

- wherein the message flow comprises a message-oriented software program wherein a message is a primary architectural element (col. 1, lines 41 – 45, and col. 3, lines 49 – 51) .

**Per Claim 3:**

Alur discloses:

- wherein the message flow is comprised in a message-oriented middleware application (FIGS. 2 – 3, col. 4, lines 40 – 52, col. 4, lines 65 – 67, and col. 5, lines 1 – 2).

**Per Claim 4:**

Alur discloses:

- wherein the message flow comprises a visual program describing processing logic as a directed graph (FIG. 11, display screen terminal 08, col. 10, lines 28 – 35) and
- wherein the message flow comprises an independent function, outside of a message sender or message receiver (FIG. 5, col. 6, lines 9 – 21).

**Per Claim 5:**

Alur discloses:

- wherein the message flow comprises a program processing a message produced by an application chosen from one of a group of applications comprising a client application and a server application (FIG. 2, col. 4, lines 38 – 52).

**Per Claim 6:**

Alur discloses:

- wherein the application comprises a message-sending-application and a message-receiving-application executing on different hardware platforms (Client/Server) (FIGS 1 – 2, col. 4, lines 5 – 11, and 25 – 50).

**Per Claim 7:**

Alur discloses:

- wherein the message-sending-application and the message-receiving-application are implemented using different software and architectural paradigms (FIGS 1 – 2, col. 4, lines 25 – 37, col. 7, lines 48 – 53).

**Per Claim 8:**

Alur discloses:

- wherein the message flow elements comprise at least one element chosen from messages, nodes, connections, terminals, statements, conditions, external resources, and exceptions (col. 2, lines 52 – 67).

**Per Claim 9:**

Alur discloses:

- wherein defining the coverage criteria comprises selecting a coverage model from at least one of processing node coverage (col. 2, lines 54 – 55),

- terminal coverage (col. 4, lines 53 – 57),
- connection (edges) coverage (col. 2, lines 54 – 55, and col. 4, line 67),
- path coverage (col. 2, lines 55 – 57),
- N-node coverage (col. 2, lines 55 – 57, and col. 4, 59 – 64),
- statement coverage (col. 1, lines 41 – 45),
- multiple condition coverage (FIG. 2, 202, col. 4, lines 50 – 52),
- exception coverage (undesired behavior)(col. 6, lines 55 – 57),
- external resources coverage (col. 1, lines 16 – 22),
- and message content coverage (col. 3, lines 52 – 59).

**Per Claim 10:**

Alur discloses:

- determining the message-flow-coverage-goal comprises establishing a required coverage level for at least one of the coverage criteria (col. 6, lines 55 – 67).

**Per Claim 11:**

Alur discloses:

- applying the test suite to the message flow comprises: performing an execution of at least a part of the test suite (col. 2, lines 37 – 51);

- and evaluating an attained coverage level resulting from the execution (col. 2, lines col2, 15 – 26).

**Per Claim 12:**

Alur discloses:

- evaluating the attained coverage level comprises: visiting one or more nodes during the execution of the at least part of the test suite (FIGS. 7A – 7C, col. 7, lines 2 – 19);
- comparing a number of processing nodes visited to a total number of all processing nodes in the message flow (col. 8, lines 29 – 32);
- and computing a processing node coverage metric responsive to the comparison (FIG. 5, col. 6, lines 11 – 21).

**Per Claim 13:**

Alur discloses:

- visiting the one or more nodes comprises entering a simple node (FIGS. 6A – 6B, col. 6, lines 2238 – 49).

**Per Claim 14:**

Alur discloses:

- visiting the one or more nodes comprises entering a compound node and visiting zero or more nodes in a constituent sub-flow (nested graph/subgraphs) (FIG. 3, col. 4, lines 60 – 67).

**Per Claim 15:**

Alur discloses:

Art Unit: 2191

- evaluating the attained coverage level comprises: traversing one or more terminals during the execution of the at least part of the test suite (col. 4, lines 53 – 55, and col. 9, lines 50 – 52);
- comparing a number of processing node terminals traversed to a total number of processing node terminals in the message flow; and computing a terminal coverage metric responsive to the comparison (col. 9, lines 45 – 49).

**Per Claim 16:**

Alur discloses:

- evaluating the attained coverage level comprises: traversing one or more connections during the execution of the at least part of the test suite (FIG. 3, edges 308, 310, and 312, col. 4, line 67, and col. 5, lines 1 – 3);
- comparing a number of connections traversed to a total number of connections in the message flow (col. 8, lines 29 – 32);
- and computing a connection coverage metric responsive to the comparison (FIG. 5, col. 6, lines 11 – 21).

**Per Claim 17:**

Alur discloses:

- evaluating the attained coverage level comprises: selecting a group of one or more sets of N-nodes from the message flow (col. 4, lines 59 – 62),
- wherein N comprises any whole number less than or equal to a total number of nodes in the message flow (col. 4, lines 62 – 64);



- performing at least one execution of the message flow so as to determine a number of nodes visited in each of the one or more sets during the at least one execution (col. 5, lines 62 – 67, and col. 6, lines 62 – 67);
- generating a respective set coverage result for each of the one or more sets, responsive to the number of nodes visited (col. 2, lines 37 – 48);
- determining a number of covered-sets, responsive to the set coverage results (FIG. 10, col. 8, lines 62 – 67, and col. 9, lines 1 – 29);
- comparing the number of covered-sets to a total number of sets in the group (col. 9, lines 42 – 49);
- and computing an N-node coverage metric responsive to the comparison (col. 9, lines 50 – 52).

**Per Claim 19:**

Alur discloses:

- wherein evaluating the attained coverage level comprises: visiting zero or more failure terminals during the execution of the at least part of the test suite (FIG. 4, col. 5, lines 26 – 38);
- comparing a number of failure terminals visited to a total number of all failure terminals in the message flow (col. 6, lines 55 – 63);
- and computing an exception coverage metric responsive to the comparison (col. 6, lines 63 – 67).

**Per Claim 20:**

Alur discloses:

- wherein evaluating the attained coverage level comprises: executing zero or more node statements at least once during the execution of the at least part of the test suite (col. 9, lines 10 – 28);
- comparing a number of node statements executed to a total number of node statements in the message flow (col. 9, lines 42 – 49);
- and computing a statement coverage metric responsive to the comparison (col. 9, lines 50 – 52).

**Per Claim 21:**

Alur discloses:

- wherein computing the statement coverage metric comprises comparing a number of node statements executed in a single node to a total number of node statements in the single node (col. 9, lines 47 – 52).

**Per Claim 22:**

Alur discloses:

- wherein computing the statement coverage metric comprises comparing a number of node statements executed in a compound node's constituent sub-flows to a total number of node statements in the compound node's constituent sub-flows (col. 4, lines 60 – 67).

**Per Claim 23:**

Alur discloses:

- wherein evaluating the attained coverage level comprises: assessing an achievement of true and false values for each of zero or more boolean sub-expressions independently during the execution of the at least part of the test suite (FIG 9, step 908, and FIG. 10, step 1012; col.8, lines 14 – 20, and col. 9, lines 6 – 9);

- comparing the achievement for the one or more boolean sub-expressions to a total number of boolean sub-expression values possible in the message flow (col. 9, lines 10 – 29);
- and computing a multiple condition coverage metric responsive to the comparison (col. 9, lines 42 – 49).

**Per Claim 24:**

Alur discloses:

- wherein computing the multiple condition coverage metric comprises comparing a number of achieved true and false values for zero or more boolean sub-expressions in a node to a total number of boolean sub-expression values possible in the node (col. 9, lines 10 – 29).

**Per Claim 29:**

Alur discloses:

- wherein evaluating the attained coverage level comprises: traversing one or more paths during the execution of the at least part of the test suite (col. 8, lines 28 – 32);
- comparing a number of paths traversed to a total number of paths in the message flow (col. 9, lines 42 – 49);
- and computing a path coverage metric responsive to the comparison (col. 9, lines 50 – 52).

**Per Claim 30:**

Alur discloses:

Art Unit: 2191

- wherein evaluating the attained coverage level comprises: performing zero or more types of accesses to an external resource during the execution of the at least part of the test suite (FIG. 1, col. 4, lines 14 – 20);
- comparing a number of types of accesses performed to a total number of types of accesses in the message flow (col. 4, lines 15 – 19);
- and computing a external resources coverage metric responsive to the comparison (col. 4, lines 20 – 24).

**Per Claim 31:**

Alur discloses:

- wherein designing the test suite responsive to the message-flow-coverage-goal comprises: identifying an initial test suite for the message flow (col. 5, lines 13 – 19; FIG. 10, col. 8, lines 63 – 67 and col. 9, line 1);
- assessing a coverage level achieved by the initial test suite (FIG. 10, col. 9, lines 1 – 9);
- and adding additional tests to the initial test suite so as to increase the coverage level (FIG. 10, col. 9, lines 10 – 29).

**Per Claim 32:**

Alur discloses:

- wherein applying the test suite comprises generating message-flow-coverage-reports (col. 8, lines 21 – 27).

**Per Claim 33:**

Alur discloses:

- integrating the message-flow-coverage-reports into a visual message flow development environment (FIG. 11, col. 10, lines 28 – 32, and lines 45 – 55).

**Per Claim 34:**

Alur discloses:

- reporting coverage graphically using at least one graphical element chosen from a set of color, shading, highlighting, graphing, fonts, line styles, icons, and labels (col. 6, lines 5 – 21).

**Per Claim 35:**

Alur discloses:

- reporting coverage via at least one medium chosen from hard-copy media and electronic media (FIG. 11, col. 10, lines 37 – 55).

**Per Claim 36:**

Alur discloses:

- wherein generating the coverage result comprises collecting coverage data using at least one method of data collection chosen from message flow instrumentation and data logging (FIG. 10, col.8, lines 63 – 65).

**Per Claim 37:**

This is the apparatus version of the claimed method discussed above (claim 1), where in all claim limitations also have been addressed and /or covered in cited areas as set forth above. Thus, accordingly, this claim is also anticipated by Alur.

**Per Claim 38:**

This is the computer software product version of the claimed method discussed above (claim 1), where in all claim limitations also have been addressed and /or covered in cited areas as set forth above, includes "a computer-readable medium having computer program instructions recorded therein, which instructions, when read by a computer, cause the computer to define coverage criteria for testing a message flow through a set of message flow elements (FIG. 11, col. 10, lines 27 – 28, lines 39 – 48, and lines 56 – 65). Thus, accordingly, this claim is also anticipated by Alur.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alur, as applied in claim 11 above, in view of Schwabe et al. US 6,848,111 B1 (hereinafter Schwabe).

**Per Claim 18:**

Alur teaches evaluating an attained coverage level resulting from the execution (Alur, col. 2, lines col2, 15 – 26), Alur does not explicitly teach performing zero or more runtime exceptions during the execution of the at least part of the test suite; comparing a number of runtime exceptions performed to a total number of all runtime exceptions in the message flow; and computing an exception coverage metric responsive to the comparison. However, Schwabe teaches performing zero or more runtime exceptions during the execution of the at least part of the test suite (Schwabe, FIG. 9, col. 12, lines 29 – 45); comparing a number of runtime exceptions performed to a total number of all runtime exceptions in the message flow (Schwabe, FIGS 5a and 5b, col. 8, lines 59 – 65, and col. 9, lines 28 – 30); and computing an exception coverage metric responsive to the comparison (Schwabe, col. 9, lines 30 – 38).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Alur to include "performing zero or more runtime exceptions during the execution of the at least part of the test suite; comparing a number of runtime exceptions performed to a total number of all runtime exceptions in the message flow; and computing an exception coverage metric responsive to the comparison" using the teaching of Schwabe. The modification would be obvious because one of ordinary skill in the art would be motivated to provide a computer implemented process for managing exceptions throwable during execution of method in one or more classes by a machine (Schwabe, col. 4, lines 49 – 51).

6. Claims 25 – 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alur as applied to claims 11 and 23 above, in view of Schwabe, and further in view of Klein et al. US 5,499,364 A (hereinafter Klein).

**Per Claim 25:**

Alur teaches computing a multiple condition coverage metric responsive to the comparison (Alur, col. 9, lines 42 – 49); Alur does not explicitly teach comparing a number of achieved true and false values for zero or more boolean sub-expressions in a compound node's constituent sub-flows to a total number of boolean sub-expression values possible in the compound node's constituent sub-flows. However, Klein teaches comparing a number of achieved true and false values for zero or more boolean sub-expressions in a compound node's constituent sub-flows to a total number of boolean sub-expression values possible in the compound node's constituent sub-flows (Klein, FIG. 6, col. 9, lines 34 – 45, col. 9, lines 55 – 67, and col. 10, lines 1 – 4).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Alur to include "comparing a number of achieved true and false values for zero or more boolean sub-expressions in a compound node's constituent sub-flows to a total number of boolean sub-expression values possible in the compound node's constituent sub-flows" using the teaching of Klein. The modification would be obvious because one of ordinary skill in

the art would be motivated to perform multiple processes or agents that coordinate their computations by exchanging messages (Klein, col. 1, lines 7 – 8).

**Per Claim 26:**

Alur teaches evaluating an attained coverage level resulting from the execution (Alur, col. 2, lines col2, 15 – 26), Alur does not explicitly teach assessing a number of values assumed by each of one or more fields in a message during the execution of the at least part of the test suite; comparing the number of values assumed to a total number of possible values for each field in the message; and computing a message content coverage metric responsive to the comparison. However, Klein teaches assessing a number of values assumed by each of one or more fields in a message during the execution of the at least part of the test suite (Klein, FIG. 6, col. 7, lines 62 – 67, and col. 10, lines 33 – 37); comparing the number of values assumed to a total number of possible values for each field in the message (Klein, col. 9, lines 56 – 57); and computing a message content coverage metric responsive to the comparison (Klein, col. 10, lines 5 – 15).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was mad to modify the method disclosed by Alur to include “assessing a number of values assumed by each of one or more fields in a message during the execution of the at least part of the test suite; comparing the number of values assumed to a total number of possible values for each field in the message; and computing a message content coverage metric responsive to the comparison” using the teaching of Klein. The modification would be obvious because one of ordinary skill in the art would be motivated to perform multiple processes or agents that coordinate their computations by exchanging messages (Klein, col. 1, lines 7 – 8).

**Per Claim 27:**

Alur teaches evaluating an attained coverage level resulting from the execution (Alur, col. 2, lines col2, 15 – 26), Alur does not explicitly teach the total number of values possible for each field in the message comprises a cross product of the message fields with their possible values. However, Klein



teaches the total number of values possible for each field in the message comprises a cross product of the message fields with their possible values (Klein, col. 6, lines 29 – 38, and lines 51 – 56).

**Per Claim 28:**

Alur teaches evaluating an attained coverage level resulting from the execution (Alur, col. 2, lines col2, 15 – 26), Alur does not explicitly teach computing a weak message content coverage metric wherein the total number of values possible for each field in the message comprises a sum of the number of possible values for each message field independently. . However, Klein teaches computing a weak message content coverage metric wherein the total number of values possible for each field in the message comprises a sum of the number of possible values for each message field independently (Klein, col. 6, lines 39 – 49, and lines 51 – 56).

***Conclusion***


7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna Deng whose telephone number is 571-272-5989. The examiner can normally be reached on Monday to Friday 9:30 AM - 6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wei Zhen can be reached at 571 –272-3708. The fax phone number for the organization where this application or proceeding is assigned is 703-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A.D. 

  
**WEI Y. ZHEN**  
**PRIMARY EXAMINER**